a dielectric solid film adjacent the ultrasound transducer.

24. (twice amended) A medical diagnostic ultrasound catheter for imaging from within a body, the catheter comprising:

a shaft;

an ultrasound transducer connected within the shaft; and

a dielectric solid film positioned between a portion of the shaft and the ultrasound transducer, wherein the dielectric surrounds at least a portion of a circumference and one end of the ultrasound transducer.

Please cancel claims 10-14, 38-43, 45 and 47.

REMARKS

Applicants have rewritten claims 15 and 24. The changes to these claims are shown in the attached Appendix with brackets for deleted matter and underlining for added matter.

In the Office Action, the Examiner rejected claims 10, 12-14, 38 and 42-43 pursuant to 35 U.S.C. § 102(b) as being anticipated by Hamm et al. (U.S. Patent No. 5,368,035). Claims 15-19, 21-22, 24, 26, 38-40 and 43-46 were rejected pursuant to 35 U.S.C. § 102(e) as being anticipated by Eberle et al. (U.S. Patent No. 5,857,974). Claims 11 and 37 were rejected pursuant to 35 U.S.C. § 103(a) as being unpatentable over Hamm et al. Claims 1-9 and 29-36 were rejected pursuant to 35 U.S.C. § 103(a) as being unpatentable over Hamm et al. in view of Crowley et al. (U.S. Patent No. 4,951,677). Claims 20, 27 and 41 were rejected pursuant to 35 U.S.C. § 103(a) as being unpatentable over Eberle et al. Claims 23, 28 and 42 were rejected pursuant to 35 U.S.C. § 103(a) as being unpatentable over Eberle et al. in view of Zdrahala (U.S. Patent No. 5,248,305) or Mahurkar et al. (U.S. Patent No. 5,221,255).

Claim 48 was allowed. Claims 25 and 47 were objected to as being allowable if rewritten in independent form.

Claims 10, 12-14, 38 and 42-43:

Claims 10, 12-14, 38 and 42-43, including independent claims 10 and 38, have been cancelled without prejudice to pursuing these claims in a continuation or related application.

Claims 15-22, 24, 26, 27, 38-41 and 43-46:

Claims 15-22, 24, 26, 27, 38-41 and 43-46, including independent claims 15, 24 and 38, were rejected as being anticipated by or unpatentable over Eberle et al. Applicants respectfully request reconsideration of the rejections for these claims for the reasons discussed below.

Independent claim 15 has been rewritten to correspond to cancelled claim 47 as originally filed without amendment. The Examiner indicated that claim 47 was allowable if rewritten to include the limitations of claim 15.

Independent claim 24 has been rewritten to correspond to cancelled claim 45 as originally filed without amendment. Independent claim 24 requires a dielectric solid film surrounding at least a portion of a circumference and one end of the ultrasound transducer. The Examiner believes that Eberle et al. disclose a dielectric film surrounding a circumference of the transducer and a portion of both ends, but Applicants respectfully traverse this characterization of Eberle et al. and request reconsideration thereof. Eberle et al. uses a flex circuit 2 with cable pads 10 and a tapered lead portion 11 (see FIG. 1). The tapered lead portion 11 is cut from the flex circuit during manufacture (col. 6, lines 15-22). The flex circuit 2 occupies a relatively outer circumference with respect to the transducer elements 8 and integrated circuit chips 6 (col. 8, lines 46-49; col. 9, lines 15-19). As shown in FIGS. 2, 4, 5 and 6, the flex circuit 2 and associated KAPTON substrate 33 form an outer circumference to the transducer elements 8 or 40. The flex circuit 2 and associated KAPTON substrate 33 extend past the ends of the transducer elements 8 or 40, but do not surround an end portion of the transducer elements 8 or 40. The substrate is used to form a cylinder (col. 3, lines 17-22). Eberle et al. do not suggest a dielectric solid film surrounding at least a portion of a circumference and one end of the ultrasound transducer.

The dependent claims 16-22, 26, 27, 44 and 46 are allowable for the reasons stated above for independent claims 15 and 24. Furthermore, limitations of these dependent claims further distinguish the claims. Claim 44 requires that the dielectric film surrounds at least portions of both ends of the ultrasound transducer. As discussed above, Eberle et al. do not disclose the substrate around the end of the transducer.

Claims 23, 28 and 42:

Dependent claims 23 and 28 were rejected as unpatentable over Eberle et al. in view of Zdrahala or Mahurkar et al. These dependent claims are allowable for the reasons stated above for independent claims 15 and 24.

Furthermore, a person of ordinary skill in the art would not have combined the catheter of Eberle et al. with the shafts of Zdrahala or Mahurkar et al. to provide the non-conductive braid connected with the shaft. Eberle et al. provide a lumen 16 within a conductive tube 18 for insertion of a guidewire (col. 6, lines 50-61). The lumen 16 and guidewire combination allow a guide catheter 78a and a smaller diameter catheter 78b with a balloon to use the same insertable guidewire (col. 14, lines 43-53). Conversely, Mahurkar et al. use a single dual-lumen hemodialysis catheter for blood in-take and blood return (col. 4, lines 33-45). Mahurkar et al. do not use ultrasound transducers.

A person of ordinary skill in the art would have used the interior, insertable guidewire of Eberle et al. without incorporating the non-conductive nylon of Mahurkar et al. The guidewire is used for multiple catheters so the added process to provide the nylon spiral of Mahurkar et al. is not needed or desirable. In addition to using the insertable guidewire, multiple catheter arrangement for Eberle et al. without the duplicative use of another guidewire, a person of ordinary skill in the art would not have included the nylon spiral 70 (col. 7, lines 32-53) on the outer wall of Mahurkar et al. to avoid interference with ultrasound scanning.

Similarly, Zdrahala discloses tubing with liquid crystal polymer for stiffness (col. 2, lines 7-28). A person of ordinary skill in the art would have used the interior, insertable guidewire of Eberle et al. without incorporating the additional processing of Zdrahala.

Claims 1-9 and 29-36:

Claims 1-9 and 29-36, including independent claims 1 and 29, were rejected as being unpatentable over Hamm et al. in view of Crowley et al. Applicants respectfully request reconsideration of the rejections for these claims for the reasons discussed below.

Regarding the combination of Hamm et al. and Crowley et al., a person of ordinary skill in the art would not combine these two references in a way providing all of the limitations of claims 1 and 29. While Crowley et al. is a parent application to Hamm et al., the two patents disclose different catheters. The motivation to combine relied on by the Examiner highlights

the differences between these different catheters. The Examiner alleges that the improved maneuverability and torquability of Hamm et al. would be used with the standard tip ultrasound catheter design, such as taught by Crowely et al. However, Hamm et al. starts with the premise that rotating transducer catheters should be improved to have the feel and torquability of a typical guidewire (col. 1, lines 26-32). The improved maneuverability and torquability of Hamm et al. is provided in part by connecting the guidewire over the transducer to the rigid transition section connected with the floppy tip (col. 5, lines 9-16 and 26-51). Forming the guidewire over the transducer provides the stiffness and torquability of Hamm et al. (col. 5, lines 31-38). The guidewires are welded to a steel cylinder in a transition section between the main body with the transducer and the flexible tip to transmit torque (col. 8, lines 21-25). Hamm et al. even note that "the Kevlar layer preferably extends over the transducer and is joined in the transition section to transmit torque and tension to the floppy tip assembly (col. 15, lines 23-25). Hamm et al. also notes that "the transition section 34 therefore also plays an important safety role in that loads are transferred to the wound flat wire coil layer 110 which is connected to the floppy tip assembly 26 through transducer assembly 23 and transition region" (col. 9, lines 38-46).

Where a flexible tip is used in Crowley et al., the transducer is maintained in a same position rather than being placed in the flexible tip (see FIG. 13). If combined, the braid or insert would extend over the transducer as taught by Hamm et al. for improved torque. Someone of skill in the art would not have combined Hamm et al. and Crowley et al. to provide the limitations of claims 1 and 29.

The dependent claims 2-9 and 30-36 are allowable for the reasons stated above for independent claims 1 and 29.

Conclusion:

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call the undersigned at (312) 321-4726.

Date: July 3, 2001

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APPENDIX

15. (thrice amended) A medical diagnostic ultrasound catheter for imaging from within a body, the catheter comprising:

a shaft;

an ultrasound transducer connected with the shaft;

a lens [or window] adjacent the ultrasound transducer, the lens having a focus; and

a dielectric solid film adjacent the ultrasound transducer.

24. (twice amended) A medical diagnostic ultrasound catheter for imaging from within a body, the catheter comprising:

a shaft;

an ultrasound transducer connected within the shaft; and

a dielectric solid film positioned between a portion of the shaft and the ultrasound transducer, wherein the dielectric surrounds at least a portion of a circumference and one end of the ultrasound transducer.